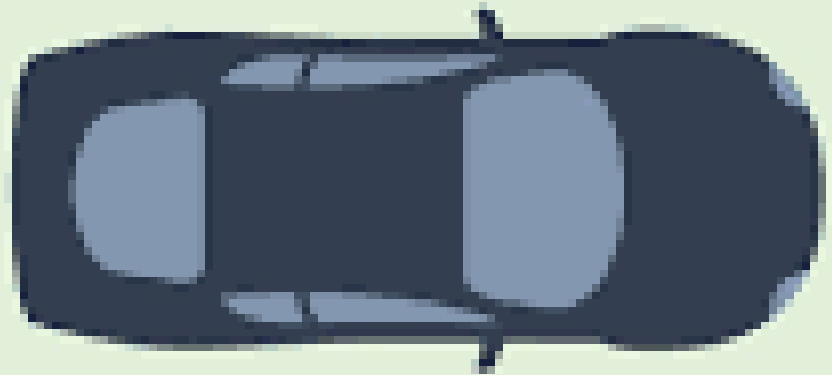
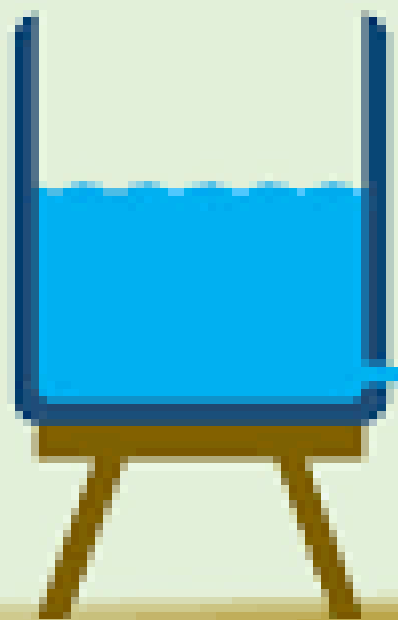


First
order

VS

Zero
order





1st Order Kinetics

Zero Order Kinetics

Dr Ayesha Jamil

Objectives

Define first order kinetics

Define zero order kinetics

Differentiate between 1st and zero order kinetics

Explain the clinical significance of both.

1st order kinetics

When the rate of elimination of drug is directly proportional to the concentration of drug in plasma

In 1st order kinetics a constant fraction is eliminated per unit time.

In 1st Order And In Zero Order Kinetics We Mainly Consider

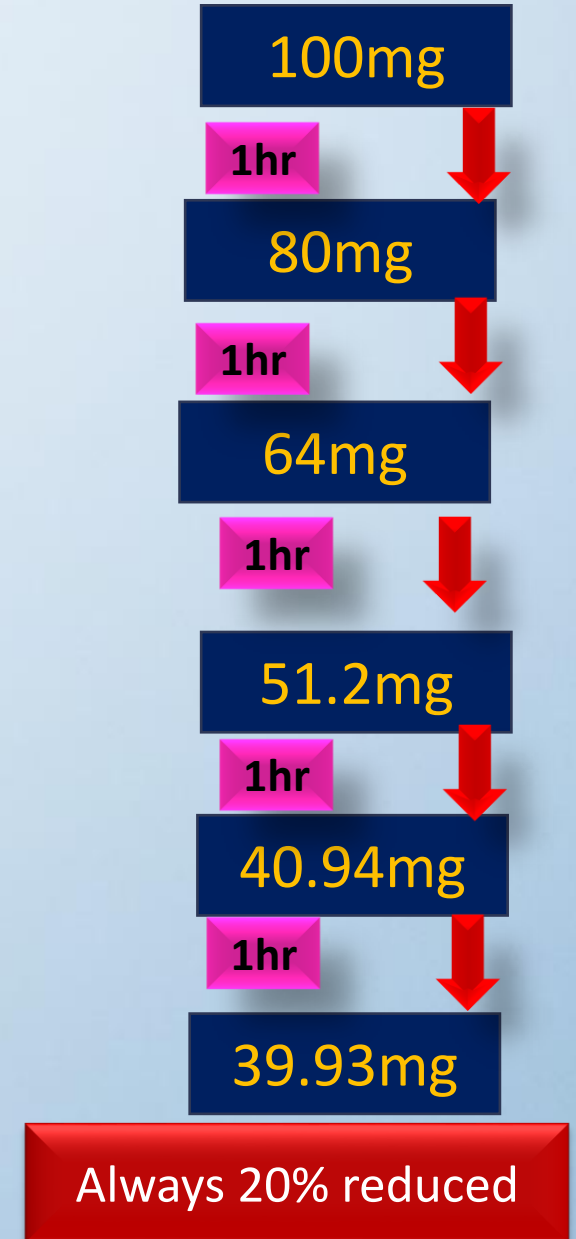
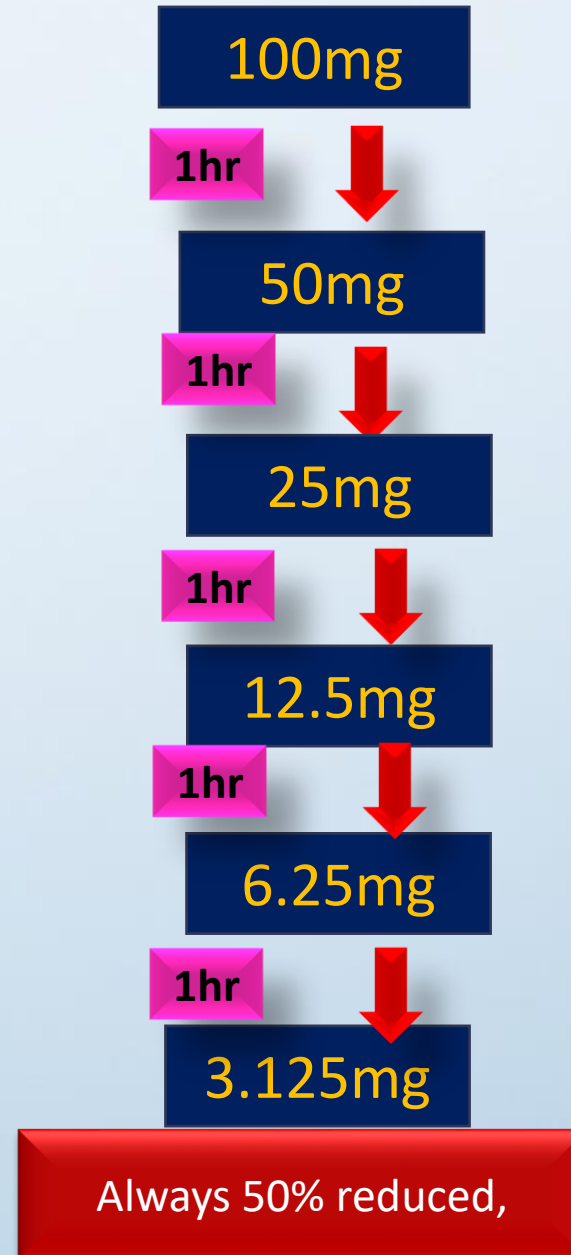
- Plasma half life
- Rate of elimination: (drug eliminated /unit time)
- Clearance: (rate of elimination/plasma concentration of drug)

1st order kinetics

$t_{1/2} = \text{constant}$

Always a constant fraction is reduced

Rate of elimination is \propto plasma concentration



1st order kinetics

100mg---20mg
51.2mg---10.24mg

Rate of elimination
is \propto plasma
concentration.

100mg—50mg
12.5mg—6.25mg



1st order kinetics

Clearance = rate of elimination/plasma concentration.

Clearance = constant



Zero order kinetics

In zero order kinetics a constant amount of drug is eliminated per unit time.

In zero order kinetics rate of elimination does not depend upon plasma concentration.

Elimination depends upon metabolism. The enzymes get saturated so no further metabolism and elimination even if the concentration of drug in plasma increases.

Zero order kinetics

$t_{1/2} \propto$ plasma conc.

rate of elimination = constant.

$CL \propto 1/\text{Plasma conc.}$



Constant amount decreased

Summary

1st order kinetics

Zero order kinetics

$t_{1/2} = \text{constant}$

$t_{1/2} \propto \text{plasma conc}$

Rate of elimination
 $\propto \text{plasma conc.}$

Rate of elimination =
constant

Clearance = constant

Clearance $\propto 1/\text{plasma conc.}$

Why some drugs follow 1st order kinetics and some follow zero order kinetics

In 1st order kinetics
the metabolizing
enzymes are
sufficient

Almost all the drugs
follow first order
kinetics

In zero order kinetics
the metabolizing
enzymes gets
saturated.

Warfarin
Alcohol
Theophylline
Tolbutamide
Phenytoin



DRUG

ENZ
100,000

100

100

10000

10000

100000

1ST ORDER

2000000

ZERO ORDER

100000

Quiz

Rate of elimination is constant in

Zero order

$t_{1/2}$ = constant in

1st order

Clearance \propto 1/plasma conc

Zero order

References

<https://youtu.be/H1KLMu6JtH0>

<https://youtu.be/XEotDfKhNTw>

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